Computer Science

# IMPLEMENTING WATERMARKING WITH QUADRATIC RESIDUES

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## Abstract

Watermarking is a technique for embedding hidden multimedia information imperceptibly, such as images, text and sounds. Generally original image data is transformed and coded watermark data is embedded in the frequency domain watermarking models[2].The paper by my advisor, Prof. Samuel Wagstaff, described novel methods of watermarking data using quadratic residues(QR) and random numbers. The methods are fast, generic, and improve the security of the watermarking techniques. My aim is to implement the method and evaluate its effectiveness in four different ways.

First, to study the QR random number generator. The challenge is to find the appropriate size for the prime number for various security levels. I will present how with the change in size of the prime and the shift registers can change the length of the cycle of the pseudo random number generator. The different favorable and unfavorable conditions for a good set of Random numbers. Second step is to watermark numerical (floating point) data, and check its distortion and time taken to watermark.

Thirdly, watermark formatted text data produced by a word processor. Shift the words slightly to the left or right to embed the watermark. The challenge is to see how noticeable is the watermark in the printed page and how can one read the watermark, given the key and the printed page. Finally, watermark image data in the frequency domain. Several digital watermarking methods have been developed in the last couple of years. I will compare the distortion produced by the QR method with that produced by the other methods to see which image looks better.